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Gender comparison of online and land-based gamblers from a nationally representative sample: Does gambling online pose elevated risk?

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ABSTRACT

The expansion of online gambling opportunities calls for better comprehension of online gambling, including relevant gender specific correlates. This study compared online and land-based gamblers among males and females separately, utilizing a nationally representative Finnish survey sample of 18–74 year olds. Online gamblers were younger than land-based gamblers and had full-time working status more often than land-based gamblers, with partial indication of land-based gamblers' monthly income being lower. Online gambling was associated with participation in computer or video gaming more strongly than with land-based gambling. Results show that the strongest predictors of online gambling common to both genders were younger age, computer gaming and gambling on multiple gambling types. Risky alcohol consumption and tobacco smoking were not associated to gambling mode when controlling for other factors. Results indicate that particularly for females online gambling may be related to higher relative expenditure and at-risk and problem gambling, providing implications for tailored interventions. The continued study of subgroups of gamblers is necessary to comprehensively understand the altering gambling milieu.

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1. Introduction

Online gambling is unique due to around the clock internet access almost everywhere. Also as a growing industry, online gambling opportunities are continuously increasing. Being cornerstone ecological factors, increased availability and accessibility of online gambling may have considerable influence on the prevalence of at-risk and problem gambling, as suggested by the Pathways model (Blaszczynski & Nower, 2002). Studying gambling

mode (i.e. online and land-based), known risky behaviors and gambling-related factors are thus of paramount importance. Here online gambling refers to gambling that takes place over the internet, while land-based gambling refers to brick-and-mortar based services.

1.1. Demographics associated to gambling mode

Online gambling tends to be more common among males, and land-based gambling more common among females (Gainsbury, Russell, Blaszczynski, & Hing, 2015; Gainsbury, Wood, Russell, Hing, & Blaszczynski, 2012; Kairouz, Paradis, & Nadeau, 2012; McBride & Derevensky, 2009). Nonetheless, online gambling may be more appealing to females than land-based gambling because of its anonymity and less stigmatizing nature (Corney & Davis, 2010; McCormack, Shorter, & Griffiths, 2014). Strictly land-based gamblers have been found to be older than those who gamble online

Abbreviations: LB, land-based; AUDIT-C, Alcohol Use Disorder Identification Test – Consumption; PGSI, Problem Gambling Severity Index; MHI-5, 5 item Mental Health Inventory; OR, odds ratio; CI, confidence interval; SD, standard deviation; OSF, Official Statistics of Finland.

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(Gainsbury, Russell, Blaszczynski, et al., 2015; Kairouz et al., 2012; McBride & Derevensky, 2009), although age related differences have also been concluded to not prevail (Gainsbury et al., 2012). Online gambling has been associated to being married (Gainsbury et al., 2012; Svensson & Romild, 2011) but also to a lower likelihood of being married (Wood & Williams, 2011). Gambling on both online and land-based platforms has been associated to a higher likelihood of working full-time (Gainsbury, Russell, Blaszczynski, et al., 2015; Gainsbury et al., 2012) and online gambling to higher income level (Gainsbury et al., 2012; Wood & Williams, 2011) compared to strictly land-based gamblers. On the contrary being a student or unemployed, and particularly for females having low level education and low income have also been associated to online gambling (Gainsbury et al., 2012; Svensson & Romild, 2011).

1.2. Risky behaviors, perceived mental health and gambling mode

The association between online gambling and substance use is somewhat ambiguous. Tobacco, alcohol and illicit drug use were concluded more common among online gamblers than land-based gamblers (Kairouz et al., 2012; Wood & Williams, 2011). In contrast, land-based gamblers have been found to have more gambling related health and psychological problems than online gamblers (Gainsbury, Russell, Hing, Wood, & Blaszczynski, 2013). While controlling for demographic and gambling-related factors, alcohol and drug use have been found to not be associated to either mode of gambling (Gainsbury et al., 2012).

Gaming is a progressively popular pastime, which for some may become harmful (Ferguson, Coulson, & Barnett, 2011). Here gaming refers to any form of computer or video gaming. Overlap in gaming and gambling is becoming evident, and online gambling should not be viewed in isolation, as there is an increasing amount of multimedia integration (Griffiths & Parke, 2010). Freemium games that mimic gambling without monetary stakes, social casino games, have been studied in relation to monetary gambling with results suggesting that gamers may migrate to gambling (Elton-Marshall, Leatherdale, & Turner, 2016; Gainsbury, Russell, & Hing, 2014; Gainsbury, Russell, King, Delfabbro, & Hing, 2016).

Research has yet to elucidate how gaming in general and gambling are associated with each other. There are similarities between problematic forms of gaming and gambling suggesting that Internet Gaming Disorder could be considered a behavioral addiction along with Gambling Disorder (APA, 2013; Duven, Müller, Beutel, & Wölfling, 2015; Petry & O'Brien, 2013) but very little research has been conducted on this subject (Baggio, Gainsbury, Berchtold, & Iglesias, 2016; Király et al., 2014). Nonetheless, research suggests frequent gaming to be associated to disordered gambling among Finnish adolescents (Castrén, Grainger, Lahti, Alho, & Salonen, 2015). Also, a positive association has been found between the frequency of online gambling and online gaming (Floros, Siomos, Fisoun, & Geroukalis, 2013). Importantly, adolescent online gamblers have been found to display higher levels of problematic internet use and problematic gambling compared to land-based gamblers, even when controlling for the number of gambling games engaged in (Baggio et al., 2016). Few studies have investigated gaming and gambling among older adults (Ariyabuddhiphongs, 2012). Being based on similar interfaces, it is intuitive that online gambling and gaming may co-occur. What is less clear is whether gaming which is excessive or otherwise perceived as detrimental is even more strongly associated to online gambling; some findings suggest an association with mental health problems (Hopley & Nicki, 2010; Petry & Weinstock, 2007; Scholes-Balog & Hemphill, 2012; Wood, Griffiths, & Parke, 2007) while others argue against it (Wood & Williams, 2011).

1.3. Gambling-related factors associated to gambling mode

Previous studies show that gambling-related factors (i.e. frequency, number of gambling types, gambling expenditure, and severity of gambling) often have the strongest associations with online gambling. Compared to land-based gamblers, online gamblers tend to gamble more frequently, gamble on a larger amount of gambling types and spend more money on gambling (Elton-Marshall et al., 2016; Gainsbury, Russell, Hing, et al., 2015; Gainsbury, Russell, Blaszczynski, et al., 2015; Gainsbury et al., 2012, 2013; Kairouz et al., 2012; Wardle, Moody, Griffiths, Orford, & Volberg, 2011). Additionally, males have been found to gamble on several online gambling types regularly more often than females (McCormack et al., 2014). Financial harms are a core aspect of gambling related harm (Langham et al., 2015), where viewing expenditure proportionately to income may provide added value (Currie et al., 2006). Spending a higher proportion of income on gambling is associated to gambling problems (Currie et al., 2006; Weinstock, Whelan, & Meyers, 2008). Examining expenditure by income has not been compared for online and land-based gamblers to the knowledge of the authors. Considering continuous forms of play and ease of payment, it is plausible that online gamblers end up spending more than their strictly land-based gambling counterparts.

Online gamblers (who often also gamble in land-based venues) have been shown to display at-risk and problem gambling more frequently than their land-based gambling counterparts (Elton-Marshall et al., 2016; Gainsbury, Russell, Blaszczynski, et al., 2015; Gainsbury et al., 2013; Kairouz et al., 2012; McBride & Derevensky, 2009; Wood & Williams, 2011). It remains somewhat unclear what the relationship is between at-risk and problem gambling and the internet as a mode of gambling. Is the internet intrinsically a detrimental mode for gambling, or do gamblers with elevated risk for developing gambling problems tend to use the internet for gambling more often than non-problem gamblers? Evidence is available that suggests it is not the internet in itself that is harmful, but rather the result of elevated overall engagement in gambling (Gainsbury et al., 2013; Wardle et al., 2011). On the other hand features of online gambling give cause for concern, for example continuous access and anonymity. Thus as a mode of gambling, the internet may assist the progression of gambling problems amongst those at elevated risk (Gainsbury et al., 2013) which would be in line with the conceptualization of the Pathways Model (Blaszczynski & Nower, 2002).

1.4. The Finnish gambling context

Gambling opportunities and advertisements are vastly evident in Finland. Gambling in Finland is government regulated with a monopoly. Up until December 2016, the monopoly has been distributed across three providers, all of which have had the right to arrange gambling services on the internet (Lotteries Act, 14 § 20.5.2011/575). The proportion of gambling that takes place on the internet is growing nationally (Salonen & Raisamo, 2015). For example, in 2015 Veikkaus Oy's (provides e.g. sports betting and lottery services in Finland) revenue was 2095.3 million euros, out of which 43.3% was generated from online gambling (Veikkaus, 2016). Based on these internal reports, the share of revenue generated by online gambling increased by 6% since 2013 (Veikkaus, 2016, 2014).

1.5. The current study

Online and land-based gamblers have not previously been compared in the Finnish context, and little is known about the gender specific characteristics. Gender specific links of problematic

gambling occurring online has been noted as a research area needing more attention (McCormack et al., 2014). Furthermore there is a dearth of evidence evaluating the convergence of gambling and computer gaming (Gainsbury et al., 2016), and previous research on the modes of gambling have often utilized school-based and online samples (Gainsbury, Russell, Blaszczynski, et al., 2015; Gainsbury et al., 2012; King, Delfabbro, Kaptis, & Zwaans, 2014; McCormack et al., 2014). Duly, utilizing a nationally representative random sample, this study investigates the gender specific distinctions between online gamblers and land-based gamblers in three domains: demographic characteristics (1), risky behaviors (referring here to tobacco smoking, alcohol consumption and gaming) and perceived mental health (2), and gambling-related factors (number of gambling types gambled; expenditure by net income; severity of gambling problems) (3).

2. Method

2.1. Sample and procedure

Data was extracted from the cross-sectional Finnish Gambling 2015 survey (Salonen & Raisamo, 2015). The survey was conducted in accordance with the ethical standards of the Declaration of Helsinki. See Salonen, Alho and Castrén's (2016) publication for sampling methods. All participants that may gamble legally (≥ 18 years old) and had gambled within the past 12 months were selected for the present study ($n = 3555$, 46.2% female). 34.2% of male and 22.1% of female gamblers had gambled online in the past 12 months. 47.5% of male and 42.2% of female gamblers had taken part in computer/video gaming in the past 12 months.

2.2. Measures

2.2.1. Gambling-related factors

Participants were asked whether they had gambled on 18 pre-defined gambling types (yes/no). These items were used to calculate how many gambling types each participant engages in. Participants who reported engaging in some form of online gambling within the past 12 months were classified as online gamblers, while the remaining gamblers were classified as strictly land-based gamblers. Online gambling has previously been operationalized in the same manner (Baggio et al., 2016; Gainsbury, Russell, & Hing, 2014; Gainsbury et al., 2012). Gambling types were not utilized in this study because online gambling types were not inquired as comprehensively as land-based gambling types. The survey nonetheless included a dichotomous question concerning online gambling in general, assuring that no online gamblers went unidentified.

Participants were asked how much money they spend on gambling on average per week. Expenditure on gambling and reported net income was used to calculate the percentage of income each participant used on gambling. Weekly expenditure was converted to monthly expenditure, accounting for the frequency of gambling. Expenditure by net income was grouped into $<1\%$ and $\geq 1\%$. This classification has been used previously (Currie et al., 2006). Reporting income equal to zero ($n = 54$) was recoded as a missing value. One outlier for weekly gambling expenditure was identified (50,000 €) and was replaced with the second-to-highest value (1500 €).

At-risk and problem gambling was evaluated with the 9 item Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). The PGSI measures gambling behavior and related consequences with response options never (0), sometimes, most of the time, and almost always (3). The sum score ranges from 0 to 27, where a score of 0 indicates no problem, 1–2 low risk gambling, 3–7 moderate

risk gambling and 8–27 problem gambling. In this sample the average PGSI score was 0.45 ($SD = 1.61$) for males and 0.20 ($SD = 0.93$) for females. The PGSI has been concluded to be uni-dimensional, internally consistent and have adequate item-response characteristics (Orford, Wardle, Griffiths, Sproston, & Erens, 2010). The PGSI displayed good internal consistency in the current sample (Cronbach's alpha = 0.83).

2.2.2. Tobacco and alcohol use

Past year tobacco smoking was inquired with a single question with 3 response options: daily, occasionally, and not at all. Alcohol consumption was determined with the three item Alcohol Use Disorders Identification Test –Consumption (AUDIT-C; Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998). Cronbach's alpha was 0.62. The sum score of the AUDIT-C ranges from 0 to 12 (items scored 0–4), in which a higher score indicates riskier consumption. Risky consumption was defined as scoring 5 or more for females and 6 or more for males (Edgren, Castrén, Jokela, & Salonen, 2016; Kaarne, Aalto, Kuokkanen, & Seppä, 2010). AUDIT-C is capable of detecting risky consumption of alcohol in the general population, and using gender specific cut-offs improves classification accuracy (Dawson, Grant, Stinson, & Zhou, 2005).

2.2.3. Gaming

Gaming was evaluated with the following question: “Have you played video, console, computer or mobile games in the past 12 months?” with two answer options (yes/no). Positive responses lead to the follow-up question “In the past 12 months how often have you felt that video, console, computer or mobile gaming may have caused you problems” with 4 response options: never, sometimes, often, and almost always. For analyses participants were classified as non-gamers, gamers who have not perceived problems (gaming without problems) and gamers who have perceived problems at least sometimes (gaming with probable problems).

2.2.4. Perceived mental health

Mental health was evaluated with the five-item Mental Health Inventory (MHI-5; Veit & Ware, 1983). Items (scored 1–6) concern feelings of nervousness, calmness, happiness and feeling down and gloomy over the past 4 weeks. Sum scores are linearly transformed to vary from 0 to 100, where high scores indicate good perceived mental health. A cut-off score of 52 was used to classify poor perceived mental health. The MHI-5 is valid for measuring mood and anxiety disorders, where a cutoff score of 52 functions adequately (Rumpf, Meyer, Hapke, & John, 2001; Strand, Dalgard, Tambs, & Rognerud, 2003). In this sample Cronbach's alpha for the MHI-5 was 0.79.

2.2.5. Demographics

Information on gender and age were retrieved from the Statistics Finland register. Employment, marital status and net income were disclosed in the survey. Here, being single includes not being in a registered relationship. Monthly net income (€) was grouped into quartiles for analysis: 0–1199, 1200–1799, 1800–2499 and ≥ 2500 .

2.3. Statistical analyses

Omnibus chi-square tests were conducted for males and females separately, analyzing whether differences were evident between strictly land-based gamblers and online gamblers on behalf of demographic characteristics (Table 1), risky behaviors and perceived mental health (Table 2), and gambling-related factors (Table 3). When the omnibus chi-square test indicated a statistically

Table 1

Demographic characteristics by gambling mode reported in column percentages (%) for weighted sample and sample size (n) for unweighted sample.

		Males (n = 1911)				X ² statistics	Females (n = 1644)				X ² statistics
		Online gamblers (n = 653)		LB ^b gamblers (n = 1258)			Online gamblers (n = 363)		LB ^b gamblers (n = 1281)		
		n	%	n	%		n	%	n	%	
Age group (years)	18–24	73	13.2	127	12.4	X ² (5, N = 1875) = 133.54, p < 0.001, Φc = 0.267	27	10.4	98	10.8	X ² (5, N = 1671) = 47.43, p < 0.001, Φc = 0.168
	25–34	147	26.6 [^]	125	12.6		86	24.4 [^]	171	14.4	
	35–44	150	21.8 [^]	181	14.8		71	21.5 [^]	161	14.7	
	45–54	134	18.8	235	18.4		61	16.4	219	17.6	
	55–64	104	14.1 [^]	300	22.5		74	17.9	328	23.5	
	65–74	45	5.5 [^]	290	19.3		44	9.4 [^]	304	19.0	
Employment status	Work full-time	407	63.6 [^]	491	40.9	X ² (8, N = 1872) = 115.06, p < 0.001, Φc = 0.248	170	48.3	547	45.2	X ² (8, N = 1670) = 18.50, p = 0.018, Φc = 0.105
	Work part-time	17	2.7	36	3.1		28	8.1	88	7.5	
	Entrepreneur	63	9.2	146	11.5		17	4.4	63	4.8	
	Student	41	7.3	86	8.3		29	9.1	76	7.6	
	Unemployed/Laid off	41	6.2	87	7.3		22	6.2	59	4.7	
	Retired (age)	59	7.3 [^]	338	23.2		58	13.0 [^]	346	22.2	
	Retired (illness)	17	2.4	53	3.9		17	4.4	47	3.4	
	Homemaker	0	0 ^a	1	0.1 ^a		20	6.0	48	4.1	
	Missing/Other ^c	8	1.3	20	1.7		2	0.5	7	0.5	
	Marital status	Single ^d	297	49.5 [^]	422		37.0	X ² (2, N = 1873) = 27.75, p < 0.001, Φc = 0.122	133	39.7	
Married		295	42.2 [^]	689	52.2	166	43.6		665	49.7	
Separated/widowed		61	8.3	147	10.8	64	16.6		248	17.5	
Net income (€)	1. Quartile (0–1199)	78	12.6 [^]	224	18.9	X ² (4, N = 1872) = 36.74, p < 0.001, Φc = 0.140	78	22.3	303	23.7	X ² (4, N = 1670) = 3.37, p = 0.498, Φc = 0.045
	2. Quartile (1200–1799)	84	13.1	240	18.1		98	25.9	362	27.4	
	3. Quartile (1800–2499)	194	29.8 [^]	279	22.5		112	31.3	349	28.0	
	4. Quartile (2500–)	269	40.5	427	33.7		59	16.3	190	15.2	
	Missing	28	4.0	88	6.8		16	4.1	77	5.8	

Observed cell count significantly higher (^) or lower (^) than expected ($p < 0.01$).^a Expected cell count less than 5; Φ_c estimate of effect size (Cramer's V).^b Land-based.^c Includes military/community service, other, and does not want to disclose.^d Includes participants not in a registered relationship.

Table 2

Risky behaviors and perceived mental health by gambling mode reported in column percentages (%) for weighted sample and sample sizes (n) for unweighted sample.

		Males (n = 1911)				Females (n = 1644)			
		Online gambling (n = 653)		LB ^b gambling (n = 1258)		Online gambling (n = 363)		LB ^b gambling (n = 1281)	
		n	%	n	%	N	%	n	%
Tobacco smoking	Daily	159	24.8	266	21.2	72	20.1	181	14.2
	Occasional	130	21.6	205	17.8	42	12.8	125	10.7
	Never	363	53.5	780	60.5	249	67.2	974	75.0
	Missing	1	0.1 ^a	7	0.5 ^a	0	0.0 ^a	1	0.2 ^a
Alcohol use ^c	No consumption	35	5.0	108	8.0	34	9.1	162	11.7
	Non-risky consumption	385	58.0	805	63.5	266	73.0	975	75.9
	Risky consumption	227	36.1 [^]	326	27.0	62	17.6	141	12.2
	Missing	6	0.9	19	1.5	1	0.3 ^a	3	0.2 ^a
Computer gaming	No gaming	253	35.5 [^]	747	55.7	156	41.0 [^]	793	59.2
	Gaming without problems	372	60.0 [^]	461	39.7	180	52.0 [^]	443	36.9
	Gaming with probable problems	26	4.2	45	4.2	27	7.0	44	3.7
	Missing	2	0.3 ^a	5	0.4 ^a	0	0.0 ^a	1	0.2 ^a
Mental health ^d	Moderate to good mental health	632	96.6	1203	95.8	346	95.3	1245	97.1
	Poor mental health	18	3.0	34	2.7	17	4.7	28	2.3
	Missing	3	0.4	21	1.5	0	0.0 ^a	8	0.6

Observed cell count significantly higher (^) or lower (^) than expected ($p < 0.01$).

^a Expected cell count less than 5; Φ_c estimate of effect size (Cramer's V).

^b Land-based.

^c Measured with Alcohol Use Disorders Identification Test – Consumption. Cut-off score for risky consumption 5 and 6 for females and males, respectively.

^d Measured with 5 item Mental Health Index. Cut-off score for poor perceived mental health is 52.

Table 3

Gambling-related factors by gambling mode reported in column percentages (%) for weighted sample and sample sizes (n) for unweighted sample.

		Males (n = 1911)				Females (n = 1644)			
		Online gamblers (n = 653)		LB ^b gamblers (n = 1258)		Online gamblers (n = 363)		LB ^b gamblers (n = 1281)	
		n	%	n	%	n	%	n	%
Number of gambling types gambled	1	64	8.9 [^]	428	33.0	52	13.5 [^]	503	39.1
	2	78	11.3 [^]	327	26.1	77	20.8 [^]	457	35.2
	3	87	12.9 [^]	243	19.3	90	24.7 [^]	188	14.9
	4	86	13.1	135	11.0	49	14.3 [^]	98	7.9
	5+	338	53.8 [^]	125	10.6	95	26.7 [^]	35	2.9
Expenditure by net income	<1%	307	48.0	630	51.4	203	57.4	718	56.6
	≥1%	302	45.3 [^]	418	31.5	129	34.0 [^]	262	18.7
	Missing ^d	44	6.7 [^]	210	17.1	31	8.6 [^]	301	24.7
PGSI ^c	Non-problem (0)	471	71.0 [^]	1095	86.9	296	81.0 [^]	1187	92.5
	Low risk (1–2)	117	18.6 [^]	122	9.8	50	13.8 [^]	80	6.3
	Moderate risk (3–7)	54	8.6 [^]	37	3.0	12	3.6 [^]	13	1.1
	Problem gambling (≥8)	11	1.8 [^]	4	0.3	5	1.6 ^{^a}	1	0.1

Observed cell count significantly higher (^) or lower (^) than expected ($p < 0.01$).

^a Expected cell count less than 5; Φ_c estimate of effect size (Cramer's V).

^b Land-based.

^c Problem Gambling Severity Index.

^d Cases with no reported income or expenditure on gambling or reporting income of 0.

significant difference, adjusted residual method post hoc analyses were conducted to specify the differences. Explicitly, p-values were calculated from the adjusted residuals of individual cells obtained from the chi-square test, and these p-values were compared to Bonferroni corrected p-values at a significance level of 0.01 (MacDonald & Gardner, 2000; Sharpe, 2015). Binary logistic regression models predicting online gambling were conducted for both genders separately with all previously utilized variables (Table 4). Number of gambling types gambled and PGSI and MHI-5 scores were entered into regression models as continuous variables. Sample weighting was used in all analyses to account for bias of non-responses, ensuring representativeness of the population by age, gender and living area (Salonen & Raisamo, 2015). Statistical analyses were conducted with IBM SPSS Statistics version 22 (SPSS Inc., Chicago, IL, USA).

3. Results

3.1. Group comparisons

3.1.1. Demographics and gambling mode

The gender specific cross tabulation of demographic characteristics and mode of gambling (Table 1) yielded the following results: Online gamblers were generally younger than land-based gamblers. Among online gamblers there was a higher rate of 25–44 year olds ($\geq 21.5\%$) compared to rates seen among land-based

gamblers ($\leq 14.8\%$) for both genders. Among the oldest age group (65–74 year olds) land-based gambling was more common regardless of gender. Among 55–64 year old males land-based gambling (22.5%) was more common than online gambling (14.1%).

There was a higher rate of singles among male online gamblers (49.5%) compared to land-based gamblers (37.0%), and likewise a higher rate of married individuals among male land-based gamblers (52.2%) compared to their online gambling counterparts (42.2%). Marital status was not associated to gambling mode among females.

Male online gamblers were significantly more likely to work full-time (63.6%) compared to land-based gamblers (40.9%). Male land-based gamblers were significantly more often age based pensioners (23.2%) than online gamblers (7.3%), with corresponding figures for females (22.2% vs. 13.0%).

There was a significantly higher rate of individuals earning 1800–2499 euros per month among male online gamblers (29.8%) than male land-based gamblers (22.5%), while there was a significantly higher rate of individuals earning 0–1199 euros per month among male land-based gamblers (18.9%) compared to online gamblers (12.6%). Net income was not associated to gambling mode among females.

3.1.2. Risky behaviors, perceived mental health and gambling mode

In the following set of chi-square analyses, risky behaviors and perceived mental health were compared between online and land-

Table 4

Binary logistic regression models predicting online gambling for males and females. Sample sizes (n) for unweighted sample.

			Male gamblers (n = 1625)				Female gamblers (n = 1299)			
			B	Wald	sig.	OR (CI 95%) ^e	B	Wald	sig.	OR (CI 95%) ^e
Constant			−3.162	26.263	<0.001	0.042	−3.617	29.421	<0.001	0.027
Age group (ref. 18–24)	25–34		0.556	4.442	0.035	1.74 (1.04–2.92)	0.740	5.624	0.018	2.10 (1.14–3.87)
	35–44		0.661	5.143	0.023	1.94 (1.09–3.43)	0.787	5.310	0.021	2.20 (1.13–4.29)
	45–54		0.773	6.363	0.012	2.17 (1.19–3.95)	0.366	1.037	0.309	1.44 (0.71–2.92)
	55–64		0.230	0.489	0.485	1.26 (0.66–2.40)	−0.070	0.035	0.852	0.93 (0.45–1.94)
	65–74		−0.162	0.122	0.727	0.85 (0.34–2.12)	−0.350	0.438	0.508	0.71 (0.25–1.99)
Employment status (ref. work full-time)	Work part-time		−0.424	1.457	0.227	0.65 (0.33–1.30)	−0.341	1.353	0.245	0.71 (0.40–1.26)
	Entrepreneur		−0.366	3.147	0.076	0.69 (0.46–1.04)	0.105	0.084	0.772	1.11 (0.55–2.26)
	Student		−0.295	0.957	0.328	0.75 (0.41–1.34)	0.374	1.327	0.249	1.45 (0.77–2.75)
	Unemployed/laid-off		−0.586	4.690	0.030	0.56 (0.33–0.95)	0.032	0.011	0.917	1.03 (0.57–1.88)
	Retired (age)		−0.533	2.641	0.104	0.59 (0.31–1.12)	−0.005	0.000	0.989	1.00 (0.47–2.10)
Marital status (ref. married)	Retired (illness)		−0.467	1.751	0.186	0.63 (0.31–1.25)	0.239	0.382	0.536	1.27 (0.60–2.71)
	Homemaker		N/A				0.285	0.766	0.381	1.33 (0.70–2.52)
	Single ^a		0.109	0.472	0.492	1.12 (0.82–1.52)	−0.080	0.191	0.662	0.92 (0.65–1.32)
	Separated/widowed		−0.088	0.165	0.685	0.92 (0.60–1.40)	0.300	2.194	0.139	1.35 (0.91–2.01)
	Occasional		−0.257	2.312	0.128	0.77 (0.56–1.08)	0.150	0.402	0.526	1.16 (0.73–1.85)
Tobacco smoking (ref. no smoking)	Daily		−0.253	2.386	0.122	0.78 (0.56–1.07)	−0.011	0.003	0.954	0.99 (0.67–1.46)
	Non-consumption		0.329	1.527	0.217	1.39 (0.83–2.34)	0.115	0.205	0.651	1.12 (0.68–1.85)
Alcohol consumption ^b (ref. non-risky consumption)	Risky consumption		−0.112	0.596	0.440	0.89 (0.67–1.19)	−0.151	0.478	0.489	0.86 (0.56–1.32)
Computer gaming (ref. no gaming)	Gaming without problems		0.405	7.795	0.005	1.50 (1.13–1.99)	0.378	6.019	0.014	1.46 (1.08–1.97)
	Gaming with probable problems		0.249	0.565	0.452	1.28 (0.67–2.45)	0.354	1.156	0.282	1.43 (0.75–2.72)
MHI-5 ^c sum score			0.005	0.895	0.344	1.01 (0.99–1.02)	0.005	0.641	0.423	1.01 (0.99–1.02)
Number of gambling types gambled			0.519	188.752	<0.001	1.68 (1.56–1.81)	0.547	98.377	<0.001	1.73 (1.55–1.93)
Expenditure by net income (ref. < 1%)	$\geq 1\%$		0.170	1.489	0.222	1.19 (0.90–1.56)	0.409	5.769	0.016	1.51 (1.08–2.10)
PGSI ^d sum score			0.071	2.640	0.104	1.07 (0.99–1.17)	0.172	5.884	0.015	1.19 (1.03–1.37)

Bold-faced rows indicate a statistically significant ($p < 0.05$) predictor.

^a Includes participants not in a registered relationship.

^b Measured with Alcohol Use Disorders Identification Test – Consumption.

^c 5 item Mental Health Inventory.

^d Problem Gambling Severity Index.

^e Odds ratio (95% confidence interval).

based gamblers for both genders separately (Table 2). There was partial evidence for an association between online gambling and tobacco smoking. Among males there was a higher rate ($p < 0.05$) of non-smokers among land-based gamblers (60.5%) compared to online gamblers (53.5%). This trend was also evident among females ($p < 0.05$), as 75.0% of land-based gamblers and 67.2% of online gamblers were non-smokers. Similarly a significant difference ($p < 0.05$) in rates of daily smokers was identified between female land-based gamblers (14.2%) and online gamblers (20.1%). Among males a higher proportion of online gamblers consumed alcohol at a risky level (36.1%) compared to land-based gamblers (27.0%). This same difference in rates was evident among females: 17.6% for online gamblers and 12.2% for land-based gamblers ($p < 0.05$).

Compared to land-based gamblers, online gamblers were more likely to be gamers. 60.0% of male and 52.0% of female online gamblers engaged in gaming without problems, while 39.7% of male and 36.9% of female land-based gamblers engaged in gaming without problems. Non-gaming was significantly more common among land-based gamblers (55.7% for males and 59.2% for females) compared to online gamblers (35.5% and 41.0%). Gaming with probable problems was not associated to the mode of gambling for either gender, nor was perceived mental health problems.

3.1.3. Gambling-related factors and gambling mode

Chi-square analyses for gambling related factors revealed that online gamblers tended to engage in a larger number of gambling types compared to land-based gamblers for both genders. A larger proportion of online gamblers (45.3% for males and 34.0% for females) spent more than 1% of net income on gambling compared to land-based gamblers (31.5% and 18.7%). Online gamblers exhibited higher problem gambling scores than land-based gamblers regardless of gender. Non-problem gambling was significantly more common among land-based gamblers compared to online gamblers for both genders.

3.2. Models predicting online gambling

In the regression model for males, the following variables were significantly ($p < 0.05$) associated to a higher probability of being an online gambler: age groups 25–34, 35–44 and 45–54 (compared to 18–24 year olds); gaming without problems (compared to non-gaming); and gambling on multiple gambling types. Additionally being unemployed or laid off significantly lowered the probability of being an online gambler compared to working full-time. Among females significant predictors of online gambling were: age groups 25–34 and 35–44; gaming without problems; gambling on multiple gambling types; expenditure amounting to over 1% of net income; and higher problem gambling scores. Results suggest that while controlling for the effects of the other variables inspected, marital status, tobacco smoking, risky alcohol consumption and perceived mental health problems were not significantly associated to mode of gambling for either gender.

Among males the logistic regression model was statistically significant ($X^2(24) = 510.31$, $p < 0.001$), explaining over one third of variance of online gambling (Nagelkerke $R^2 = 0.37$). The model classified 86.5% of male land-based gamblers and 60.2% of male online gamblers correctly. The model was also significant for females ($X^2(24) = 261.15$, $p < 0.001$), explaining below one third of variance of online gambling (Nagelkerke $R^2 = 0.26$). The model classified 94.3% of female land-based gamblers 34.9% of female online gamblers correctly. Hosmer and Lemeshow test indicates for both genders that the models fit data ($p > 0.05$). There was no indication of multicollinearity (VIF values < 2 and Tolerance > 0.5 for

all independent variables). With only one male gambler that was a homemaker, regression results could not be reported for this employment status.

4. Discussion

4.1. Demographics

In partial alignment with assumptions, regardless of gender online gamblers were proportionately more often younger than strictly land-based gamblers. Both participation in gambling and prevalence of problem gambling have increased among 18–24-year-olds in Finland between 2011 and 2015 (Salonen & Raisamo, 2015). However, present findings indicate that gambling online was most common among 25 to 44 year olds for both genders, while the model additionally suggested that males aged 45–54 are more likely to gamble online compared to 18–24 year olds. Differences in gambling tendencies among different age groups are likely to reflect general differences in prevailing life situations and in economic statuses, as discussed subsequently.

Firstly, 18–24 year olds are often students within the Finnish context, and this may influence their gambling behavior. In 2015 over 70% of the population aged $15 \leq$ years acquire education beyond primary and lower secondary level, such that among 20–29 year-olds 83% had attained at least upper secondary level education (OSF, 2016a). On completion of upper secondary education, individuals are about 18 years old, and hereafter 30–40% immediately continue studies at a higher level (Ministry of Education and Culture, 2016; OSF, 2016b). Internationally this age group typically presents high involvement in gambling practices (i.e. college students) (Barnes, Welte, Hoffman, & Tidwell, 2010; Blinn-Pike, Worthy, & Jonkman, 2007; St-Pierre, Temcheff, Gupta, Der-evensky, & Paskus, 2014). On the other hand as students tend to have limited income, their financial situation may cause them to refrain from gambling. In sum, online gambling among young adults needs to be investigated further.

Secondly, during the third to fifth decades of life individuals are often employed full-time, and thus are likely to have enough disposable income in order to gamble. Age related pension may not be granted in Finland before the age of 63 years, and the transitional age for age related pension in Finland is 63–68 years (Finnish Centre for Pensions, 2016; Rapo, 2014). As such, this age group is considered to partially be taking part in working life, but may also have more time and money for leisure activities, including gambling. It is also known that older adults favor casinos, slot machines and bingo as gambling activities (Tse, Hong, Wang, & Cunningham-Williams, 2012), with distinct motivations to gamble (entertainment and leisure more than money and rewards) (Martin, Lichtenberg, & Templin, 2011). Overall, online problem gambling studies conducted among older adults remain scarce (Sauvaget et al., 2015).

Age related differences in regard to online gambling probably also depict age group differences in the familiarity with necessary technologies to engage in online gambling. Between 2011 and 2015 Finnish online gambling increased in all age groups above 35-years (Salonen & Raisamo, 2015), and gambling has been noted as a growing social activity among older adults (Subramaniam et al., 2015; Zaranek & Chapleski, 2005). As practically the entire population aged 16–54 uses the internet, increases in the amount of users is evident only among older age groups (OSF, 2016c). For example, in 2016 92% of 55–64 year olds and 74% of 65–74 year olds used the internet (OSF, 2016c). Thus increasing rates of online gambling among older age groups may reflect the general rise in internet use among these age groups.

Being unemployed or laid-off was the only significant working

status in the model, predicting land-based gambling among males. This stands in direct contrast to findings of Gainsbury et al. (2012). It may be that males without work are less likely to have disposable income on bank accounts or the possibility to gamble online due to faulty credit rating. Marital status was not associated to online gambling when controlling for other factors in the regression model. Taken together findings advocate that online gamblers are heterogeneous as suggested previously (Blaszczynski, Russell, Gainsbury, & Hing, 2016), with some evident gender differences.

4.2. Risky behaviors and perceived mental health

Neither tobacco smoking or risky alcohol consumption were associated to online gambling in the regression models. The apparent higher degree of risky alcohol consumption and tobacco smoking among online gamblers indicated in chi-square analyses may be explicable by other confounding factors, potentially at-risk and problem gambling as recently suggested (Baggio et al., 2016). Consuming alcohol while gambling was most common among mixed mode gamblers (i.e. engaging in both online and land-based gambling), and least common among strictly online gamblers (Blaszczynski et al., 2016). Our results are in line with the aforementioned study, since online gamblers were largely representative of mixed mode gamblers. Interestingly, mixed-mode gamblers have been found to consume alcohol and tobacco less while gambling online than when gambling in land-based venues (Gainsbury, Russell, Hing, & Wood 2014). Taken together, increased gambling may lead to increased alcohol consumption particularly among mixed mode gamblers.

Gaming without problems was clearly associated with online gambling which may imply that those who are accustomed to using computers tend to do so for a wide array of (leisure) activities. There may also be a more direct link between gambling and gaming, as the most common channels for encountering simulated gambling include popular video games (King et al., 2014), and bets have been found to be placed on computer games (Elton-Marshall et al., 2016). The fact that gaming with probable problems was not associated to gambling mode may be due to too few participants falling into this category, which in turn could be due to a low rate of self-recognition of problems. This null finding may also be due to measurement, since a single question was used instead of validated instrument. Poor perceived mental health was not associated to gambling mode at any point, suggesting that online gamblers do not perceive psychological problems more or less than land-based gamblers do. This is in line with the finding that mixed mode gamblers and land-based gamblers are at equivalent risk of experiencing psychosocial distress as proposed by Blaszczynski et al. (2016), who further suggested that strictly online gamblers were at lower risk. The gambling market in Finland is highly developed; in this context, as previously postulated by Wardle et al. (2011), online gambling may simply act as an additional mode of access for gambling. On the other hand our results are in conflict with the finding that online gamblers display higher rates of psychological distress (Gainsbury, Russell, Hing, Wood, et al., 2014), hence more research is needed on this.

4.3. Gambling-related factors

Online gamblers gambled on a larger number of gambling types than land-based gamblers. To elucidate results from the models, gamblers engaging in four gambling types were around four times as likely to be online gamblers as those gambling one gambling type. This same trend has been identified among adolescent gamblers (Elton-Marshall et al., 2016). The positive association between number of gambling types gambled and online gambling is likely

due to both that beginning to gamble on an additional mode leads to an increase in number of gambling types, and that the resulting increased availability leads to increased gambling (Gainsbury et al., 2012). Importantly, previous research suggests the positive association between mixed-mode gambling and at-risk and problem gambling to be due to the elevated and more diverse participation among these gamblers (Baggio et al., 2016; Blaszczynski et al., 2016; Gainsbury, Russell, Blaszczynski, et al., 2015).

In the regression models, gambling expenditure amounting to over 1% of net income and gambling severity were associated with online gambling only among females, supporting findings that mixed-mode gamblers experience more gambling problems than strictly land-based or online gamblers (Blaszczynski et al., 2016; Elton-Marshall et al., 2016). Higher expenditure among female online gamblers may not be limited to those economically well-off, as income quartile was not associated to gambling mode. It has been suggested that mixed mode gamblers represent a subgroup of gamblers with some expendable income and few indispensable costs compared to single mode gamblers, whereby recreational gambling may lead to overspending and related problems (Gainsbury, Russell, Blaszczynski, et al., 2015).

There are several plausible explanations why online gambling may be particularly harmful among females. First, in contrast to males, females have been noted to prefer games of chance and gambling types that provide continuous forms of play (McCormack et al., 2014; Wardle et al., 2007). Compared to low event frequency games, high frequency online gambling types (e.g. online slot machines) may lead to higher expenditure (Auer & Griffiths, 2016). Second, females view the internet as safe and less intimidating environment to gamble (McCormack et al., 2014). Third, females' choice to gamble online may be influenced by advertisements more strongly than among males (McCormack et al., 2014). Fourth, males possibly use responsible gambling tools more actively than females, which are readily available for online gambling environments (Blaszczynski et al., 2016). Fifth, from the view of the adaptation hypothesis (Abbott, 2006; Storer, Abbott, & Stubbs, 2009), females may be in a different phase of adaptation (i.e. leveling may have already occurred for males). Females may be exposed to online gambling in an unprecedented manner, considering for example that marketing of online gambling towards females is a relatively novel phenomenon.

Finally, it's possible that social casino gaming is central to the female specific associations; as engagement in both activities is more common among females compared to males (Abarbanel & Rahman, 2015) and migration from social casino gaming to online gambling has been linked to gambling problems (Gainsbury et al., 2016). Additionally, making in-game purchases in social casino games (or other freemium games) may lower the threshold to spend money on online gambling. In fact indulging in micro-transactions was the sole predictor of migration from social casino gaming to online gambling in an online sample of social casino gamers (Kim, Wohl, Salmon, Gupta, & Derevensky, 2014). The observed relationship between gaming and gambling may accordingly also be related to social casino games. Speculation concerning social casino games goes beyond what can be inferred from this study, but is a topical issue as online gambling and social casino gaming industries are converging (H2 Gambling Capital & Odo, 2013). It is important to realize that social casino games are often linked to Facebook, and companies seeking to migrate social casino gamers to online gambling may use profile information to pinpoint potential target groups (Abarbanel & Rahman, 2015). Gaming and gambling need to be studied in more detail in the future, looking also into gaming genres, using more comprehensive measurement of problematic gaming (e.g. IGD-20) and longitudinal designs (Elton-Marshall et al., 2016; Pontes, Király,

Demetrovics, & Griffiths, 2014).

In January 2017, the three Finnish gambling service operators were merged into a single company. This merger may enhance the opportunities for responsible gambling, but detrimental consequences may also follow. This merger will lead to all online gamble services being provided from one single website, which may encourage individuals to engage in a wider variety of gambling types. Future research evaluating the impact of this merger is of chief importance, potentially providing insights on how to appropriately regulate gambling in cyberspace.

4.4. Limitations

This study was conducted utilizing data with clear merits, as gamblers were selected from a nationally representative survey sample with a high response rate and which was weighted for analyses. On the contrary, cross-sectional design hinders causal inferences to be made, and self-report is prone to bias. Importantly, self-reported amount of money spent gambling may be estimated incorrectly, particularly when actual expenditure is high (Auer & Griffiths, 2016). Online gamblers also included gamblers who may have also participated in land-based gambling. This may have influenced results, as those who gamble both online and land-based are more likely to have gambling problems than the minority who exclusively gamble online (Gainsbury, Russell, Blaszczynski, et al., 2015). For the chi-square analyses appropriate post-hoc testing was conducted, but the effect sizes for the identified group differences were to a large extent small (Cohen, 1988), and may be considered trivial. Due to missing information on net income and gambling expenditure, several cases were omitted from the regression analyses. Gender differences seen in regression models are only conjectural, as odds ratio confidence intervals overlapped throughout (Gelman & Stern, 2006). On the bright side, the subjective experience of gaming being problematic is an important aspect of gaming which has not been examined often, as is also the case for inspecting expenditure in relation to income. Importantly, few previous studies in this research field have examined gender specific correlates of online gambling.

5. Conclusions

Online gambling is a continuously expanding practice, and accordingly a greater understanding of online gambling needs to be gained. Previous findings are partially divergent on this subject, for example concerning how online gambling relates to demographic factors, gambling problems and substance use. This study builds upon this body of research by comparing the associations of online gambling and land-based gambling for males and females separately using a nationally representative sample.

Results show that in general online gamblers were younger than land-based gamblers among both genders. Nonetheless, online gambling is not limited to young adults, as it is encountered among individuals in their 50's, even more so than among 18 to 24 year olds. For both genders results indicate that online gamblers are typically experienced with computer gaming, and likewise that online gamblers engage in a higher number of gambling types than land-based gamblers. Risky alcohol consumption and tobacco smoking were not associated to gambling mode when controlling for other factors. Importantly, particularly for females online gambling may be related to higher relative expenditure and at-risk and problem gambling, providing implications for tailored interventions. In line with previous studies, it seems that the harmfulness of the internet as a mode of gambling is particularly related to the accompanied increased amount of gambling. The continued study of subgroups of gamblers is necessary to comprehensively

understand the altering gambling milieu.

Declaration of interest

Authors have no actual or potential conflicts of interest that may inappropriately influence, or be perceived to influence, this work.

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